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DRINKING WATER SURVEILLANCE PROGRAM

**OSHAWA
WATER SUPPLY
SYSTEM**

ANNUAL REPORT 1990

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DRINKING WATER SURVEILLANCE PROGRAM

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EXECUTIVE SUMMARY
DRINKING WATER SURVEILLANCE PROGRAM
OSHAWA WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Oshawa water supply system is a conventional treatment plant which treats water from Lake Ontario. The process consists of coagulation, flocculation, sedimentation, filtration, fluoridation and disinfection. This plant has a rated capacity of 136.4 x 1000 m³/day. The Oshawa water supply system serves a population of approximately 278,700.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Oshawa water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

DRINKING WATER SURVEILLANCE PROGRAM

OSHAWA WATER SUPPLY SYSTEM 1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Oshawa water treatment plant in February, 1987. Previous annual reports have been published for 1987, 1988 and 1989.

PLANT DESCRIPTION

The Oshawa water supply system is a conventional treatment plant which treats water from Lake Ontario. The process consists of coagulation, flocculation, sedimentation, filtration, fluoridation and disinfection. This plant has a rated capacity of $136.4 \times 1000 \text{ m}^3/\text{day}$. The Oshawa water supply system serves a population of approximately 278,700.

The sample day flows ranged from $50.6 \times 1000 \text{ m}^3/\text{day}$ to $73.8 \times 1000 \text{ m}^3/\text{day}$.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing

samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were reported above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of

the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded ODWO Maximum Desirable Concentration of 15°C in 3 of 18 treated and distributed water samples with a maximum reported value of 17.3°C.

CHEMISTRY (LAB)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 18 of 18 treated and distributed water samples with a maximum reported value of 146.9 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 8 of 18 treated and distributed water samples with a maximum reported value of 280.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water.

Phenolics exceeded the ODWO Aesthetic or Recommended Operational Guideline of 2 ug/L in 2 of 6 treated water samples with a maximum reported value of 3.8 ug/L.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 18 treated and distributed water samples analyzed with a maximum level of 42.1 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Oshawa water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

OSHAWA WSS

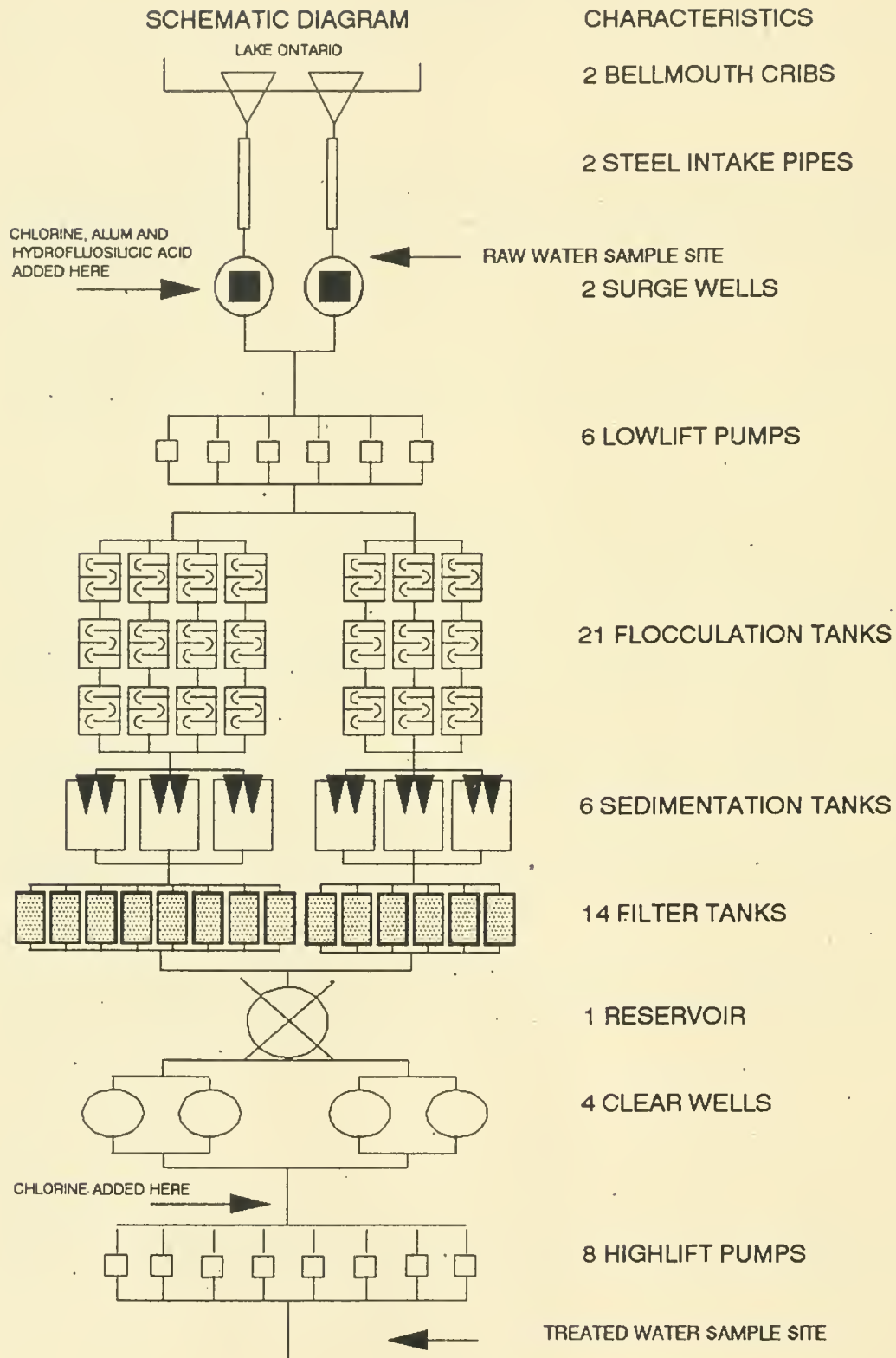


TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

WORKS #: 220000772
PLANT NAME: OSHAWA WSS

DISTRICT: TORONTO
REGION: CENTRAL
DISTRICT OFFICER: D. BEACH

UTM #: 176748154858655

PLANT SUPERINTENDENT: J.A. CLARKE

ADDRESS: 1540 RITSON RD.,
OSHAWA, ONTARIO
L1G 6Z6
(416) 723-7233

MUNICIPALITY: DURHAM REGION
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	-	(X 1000 M3)
DESIGN CAPACITY:	-	(X 1000 M3/DAY)
RATED CAPACITY:	136.380	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
-----	-----
OSHAWA	124,278

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER -----	LOCATION -----	FREQUENCY -----
FREE CHLORINE RESIDUAL	TREATED WATER IN LAB	EVERY 2 HOURS
	RAW WATER	CONTINUOUS
	TREATED WATER	CONTINUOUS
FLUORIDE	TREATED WATER	2 TIMES/DAY
PH	RAW WATER	CONTINUOUS
TEMPERATURE	RAW WATER	CONTINUOUS
TURBIDITY	TREATED WATER IN LAB	EVERY 2 HOURS
	AFTER FILTERS	CONTINUOUS
	RAW WATER	CONTINUOUS
	TREATED WATER	CONTINUOUS

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS SAMPLE DAY CONDITIONS FOR 1990

DATE	DELAY * TIME(HRS)	FLOW (1000M3)	TREATMENT CHEMICAL DOSAGE (MG/L)		CHLORINE	COAGULATION		FLUORIDATION	POST CHLORINATION	
			PRE CHLORINATION	CHLORINE		POLY ALUMINUM CHLORIDE	HYDROFLUOSILICIC ACID		CHLORINE	CHLORINE
JAN 10	2.50	50.620	2.16			1.30		1.05		.25
MAR 22	2.50	61.271	1.61			3.60		1.10		.26
MAY 23	2.75	56.452	1.45			2.30		1.20		.15
JUL 18	2.75	73.816	1.28			2.10		1.30		.21
SEP 26	3.00	58.578	1.33			2.70		1.35		.58
NOV 27	3.00	52.532	1.28			2.90		1.22		.64

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
FECAL COLIFORM MF	6	4	0	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	5	0	0	5	2	0	6	2	0
TOTAL COLIFORM MF	6	3	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	6	6	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	18	13	0	5	0	0	5	2	0	6	2	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	.	.	.	6	6	0	12	12	0	12	12	0
FLD CHLORINE FREE	.	.	.	6	6	0	12	12	0	12	12	0
FLD CHLORINE (TOTAL)	.	.	.	6	6	0	12	12	0	12	12	0
FLD PH	6	6	0	6	6	0	12	12	0	12	12	0
FLD TEMPERATURE	6	6	0	6	6	0	12	12	0	12	12	0
FLD TURBIDITY	6	6	0	6	6	0	10	10	0	12	12	0
*TOTAL SCAN CHEMISTRY (FLD)	18	18	0	36	36	0	70	70	0	72	72	0
CHEMISTRY (LAB)												
ALKALINITY	6	6	0	6	6	0	12	12	0	12	12	0
CALCIUM	6	6	0	6	6	0	12	12	0	12	12	0
CYANIDE	6	0	0	6	0	0	.	.	.	.	.	.
CHLORIDE	6	6	0	6	6	0	12	12	0	12	12	0
COLOUR	6	0	5	6	1	5	12	8	4	12	1	11
CONDUCTIVITY	6	6	0	6	6	0	12	12	0	12	12	0
DISS ORG CARBON	6	6	0	6	6	0	12	12	0	12	12	0
FLUORIDE	6	6	0	6	6	0	12	12	0	12	12	0
HARDNESS	6	6	0	6	6	0	12	12	0	12	12	0
IONCAL	6	6	0	6	6	0	12	12	0	12	12	0
LANGELIERS INDEX	6	6	0	6	6	0	12	12	0	12	12	0
MAGNESIUM	6	6	0	6	6	0	12	12	0	12	12	0
SODIUM	6	6	0	6	6	0	12	12	0	12	12	0
AMMONIUM TOTAL	6	4	0	6	1	2	12	5	2	12	5	1
NITRITE	6	5	1	6	0	5	12	4	6	12	3	7
TOTAL NITRATES	6	6	0	6	6	0	12	12	0	12	12	0
NITROGEN TOT KJELD	6	6	0	6	6	0	12	12	0	12	12	0
PH	6	6	0	6	6	0	12	12	0	12	12	0
PHOSPHORUS FIL REACT	6	0	3	6	2	4	.	.	.	.	.	.
PHOSPHORUS TOTAL	6	6	0	6	1	5	.	.	.	.	.	.
SULPHATE	6	6	0	6	6	0	12	12	0	12	12	0
TURBIDITY	6	6	0	6	5	1	12	12	0	12	10	2
*TOTAL SCAN CHEMISTRY (LAB)	132	111	9	132	100	22	228	209	12	228	199	21

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS												
SILVER	6	0	0	6	0	0	12	0	1	12	0	0
ALUMINUM	6	6	0	6	6	0	12	12	0	12	12	0
ARSENIC	6	0	6	6	2	4	12	1	11	12	4	8
BARIUM	6	6	0	6	6	0	12	12	0	12	12	0
BORON	6	6	0	6	6	0	12	12	0	12	12	0
BERYLLIUM	6	0	1	6	0	1	12	0	1	12	0	0
CADMIUM	6	0	1	6	0	0	12	0	4	12	0	0
COBALT	6	0	6	6	0	5	12	0	12	12	0	11
CHROMIUM	6	0	5	6	0	6	12	0	10	12	0	8
COPPER	6	0	6	6	0	6	12	8	4	12	10	2
IRON	6	2	3	6	0	3	12	12	0	12	0	3
MERCURY	6	0	1	6	0	0						
MANGANESE	6	6	0	6	5	1	12	12	0	12	10	2
MOLYBDENUM	6	6	0	6	6	0	12	12	0	12	12	0
NICKEL	6	0	6	6	0	4	12	6	6	12	6	6
LEAD	6	0	6	6	0	3	12	6	6	12	8	4
ANTIMONY	6	2	4	6	3	3	12	8	4	12	10	2
SELENIUM	6	0	0	6	0	2	12	0	4	12	0	5
STRONTIUM	6	6	0	6	6	0	12	12	0	12	12	0
TITANIUM	6	4	2	6	3	3	12	4	8	12	2	10
THALLIUM	6	0	0	6	0	0	12	0	0	12	0	0
URANIUM	6	0	6	6	0	6	12	0	12	12	0	12
VANADIUM	6	0	6	6	0	6	12	0	12	12	0	12
ZINC	6	5	1	6	1	5	12	10	2	12	10	2
*TOTAL SCAN METALS	144	49	60	144	44	58	276	127	97	276	120	87
*TOTAL GROUP INORGANIC & PHYSICAL	294	178	69	312	180	80	574	406	109	576	391	108
CHLOROAROMATICS												
HEXACHLOROBUTADIENE	6	0	0	6	0	1	6	0	0	6	0	0
123 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
1234 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
1235 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
124 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
1245 T-CHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
135 TRICHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
HCB	6	0	0	6	0	0	6	0	0	6	0	0
HEXACHLOROETHANE	6	0	0	6	0	1	6	0	1	6	0	0
OCTACHLOROSTYRENE	6	0	0	6	0	0	6	0	0	6	0	0
PENTACHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
236 TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	6	0	0
245 TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	6	0	0
26A TRICHLOROTOLUENE	6	0	0	6	0	0	6	0	0	6	0	0
*TOTAL SCAN CHLOROAROMATICS	84	0	0	84	0	2	84	0	1	84	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE

CHLOROPHENOLS												
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0

PAH												
PHENANTHRENE	6	0	0	6	0	0	1	0	0	1	0	0
ANTHRACENE	6	0	0	6	0	0	1	0	0	1	0	0
FLUORANTHENE	6	0	0	6	0	0	1	0	0	1	0	0
PYRENE	6	0	0	6	0	0	1	0	0	1	0	0
BENZO(A)ANTHRACENE	6	0	0	6	0	0	1	0	0	1	0	0
CHRYSENE	6	0	0	6	0	0	1	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	5	0	0	5	0	0	1	0	0	1	0	0
BENZO(E) PYRENE	6	0	0	6	0	0	1	0	0	1	0	0
BENZO(B) FLUORANTHEN	6	0	0	6	0	0	1	0	0	1	0	0
PERYLENE	6	0	0	6	0	0	1	0	0	1	0	0
BENZO(K) FLUORANTHEN	6	0	0	6	0	0	1	0	0	1	0	0
BENZO(A) PYRENE	6	0	0	6	0	0	1	0	0	1	0	0
BENZO(G,H,I) PERYLEN	6	0	0	6	0	0	1	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	6	0	0	6	0	0	1	0	0	1	0	0
INDENO(1,2,3-C,D) PY	6	0	0	6	0	0	1	0	0	1	0	0
BENZO(B) CHRYSENE	6	0	0	6	0	0	1	0	0	1	0	0
CORONENE	6	0	0	6	0	0	1	0	0	1	0	0
*TOTAL SCAN PAH	101	0	0	101	0	0	17	0	0	17	0	0

PESTICIDES & PCB												
ALDRIN	6	0	0	6	0	0	6	0	0	6	0	0
ALPHA BHC	6	0	5	6	0	6	6	0	6	6	0	6
BETA BHC	6	0	0	6	0	0	6	0	0	6	0	0
LINDANE	6	0	0	6	0	1	6	0	0	6	0	0
ALPHA CHLORDANE	6	0	0	6	0	0	6	0	0	6	0	0
GAMMA CHLORDANE	6	0	0	6	0	0	6	0	0	6	0	0
DIELDRIN	6	0	0	6	0	0	6	0	0	6	0	0
METHOXYCHLOR	6	0	0	6	0	0	6	0	0	6	0	0
ENDOSULFAN 1	6	0	0	6	0	0	6	0	0	6	0	0
ENDOSULFAN II	6	0	0	6	0	0	6	0	0	6	0	0
ENDRIN	6	0	0	6	0	0	6	0	0	6	0	0
ENDOSULFAN SULPHATE	6	0	0	6	0	0	6	0	0	6	0	0
HEPTACHLOR EPOXIDE	6	0	0	6	0	0	6	0	0	6	0	0
HEPTACHLOR	6	0	0	6	0	0	6	0	0	6	0	0
MIREX	6	0	0	6	0	0	6	0	0	6	0	0
OXYCHLORDANE	6	0	0	6	0	0	6	0	0	6	0	0
OPDDT	6	0	0	6	0	0	6	0	0	6	0	0
PCB	6	0	0	6	0	0	6	0	0	6	0	0
DDD	6	0	0	6	0	0	6	0	0	6	0	0
PPDDE	6	0	0	6	0	0	6	0	0	6	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	6	0	0	6	0	0	6	0	0	6	0	0
AMETRINE	6	0	0	6	0	0	.	.	.	.	.	.
ATRAZINE	6	0	2	6	0	1	.	.	.	.	.	.
ATRATONE	6	0	0	6	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	6	0	0	6	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	6	0	0	6	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETONE	6	0	0	6	0	0	.	.	.	.	.	.
PROPACINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETRYNE	6	0	0	6	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	5	0	0	5	0	0	.	.	.	.	.	.
SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	6	0	0	6	0	0	.	.	.	.	.	.
METOLACHLOR	6	0	0	6	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	1	0	0	1	0	0	1	0	0	1	0	0
*TOTAL SCAN PESTICIDES & PCB	204	0	7	204	0	8	127	0	6	127	0	6

PHENOLICS												
PHENOLICS	5	2	2	6	2	2	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	5	2	2	6	2	2	0	0	0	0	0	0

SPECIFIC PESTICIDES												
TOXAPHENE	6	0	0	6	0	0	6	0	0	6	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	2	0	0	2	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
PHORATE	2	0	0	2	0	0	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	1	0	0	1	0	0	.	.	.	.	.	.
CICP	1	0	0	1	0	0	.	.	.	.	.	.
DIALATE	1	0	0	1	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	1	0	0	1	0	0	.	.	.	.	.	.
IPC	1	0	0	1	0	0	.	.	.	.	.	.
PROPOXUR	1	0	0	1	0	0	.	.	.	.	.	.
CARBARYL	1	0	0	1	0	0	.	.	.	.	.	.
BUTYLATE	1	0	0	1	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	50	0	0	50	0	0	6	0	0	6	0	0

VOLATILES												
BENZENE	6	0	1	6	0	1	6	0	1	6	0	1
TOLUENE	6	0	0	6	0	1	6	0	1	6	0	0
ETHYLBENZENE	6	0	3	6	0	3	6	0	2	6	0	5
P-XYLENE	6	0	0	6	0	0	6	0	0	6	0	0
M-XYLENE	6	0	0	6	0	0	6	0	0	6	0	0
O-XYLENE	6	0	0	6	0	0	6	0	0	6	0	1
STYRENE	6	0	5	6	0	1	6	0	4	6	0	2
1,1 DICHLOROETHYLENE	6	0	0	6	0	0	6	0	0	6	0	0
METHYLENE CHLORIDE	6	0	0	6	0	0	6	0	0	6	0	0
1,1,2 DICHLOROETHYLENE	6	0	0	6	0	0	6	0	0	6	0	0
1,1 DICHLOROETHANE	6	0	0	6	0	0	6	0	0	6	0	0
CHLOROFORM	6	0	0	6	6	0	6	6	0	6	6	0
111, TRICHLOROETHANE	6	0	0	6	0	1	6	0	0	6	0	1
1,2 DICHLOROETHANE	6	0	0	6	0	0	6	0	0	6	0	0
CARBON TETRACHLORIDE	6	0	0	6	0	1	6	0	0	6	0	1
1,2 DICHLOROPROPANE	6	0	0	6	0	0	6	0	0	6	0	0
TRICHLOROETHYLENE	6	0	0	6	0	0	6	0	0	6	0	0
DICHLOROBROMOMETHANE	6	0	0	6	6	0	6	6	0	6	6	0
112 TRICHLOROETHANE	6	0	0	6	0	0	6	0	0	6	0	0
CHLORODIBROMOMETHANE	6	0	0	6	6	0	6	6	0	6	6	0
T-CHLOROETHYLENE	6	0	0	6	0	0	6	0	0	6	0	0
BROMOFORM	6	0	0	6	0	6	6	0	6	6	0	6
1122 T-CHLOROETHANE	6	0	0	6	0	0	6	0	0	6	0	0
CHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
1,4 DICHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
1,3 DICHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
1,2 DICHLOROBENZENE	6	0	0	6	0	0	6	0	0	6	0	0
ETHYLENE DIBROMIDE	6	0	0	6	0	0	6	0	0	6	0	0
TOTL TRIHALOMETHANES	6	0	0	6	6	0	6	6	0	6	6	0
*TOTAL SCAN VOLATILES	174	0	9	174	24	14	174	24	14	174	24	17
*TOTAL GROUP ORGANIC	630	2	18	631	26	26	408	24	21	408	24	23

KEY TO TABLE 5 and 6

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3+. AO for Total Xylenes
4. Recommended Operational Guideline
- B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissible Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I. NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2			
		STANDING		FREE FLOW		STANDING		FREE FLOW	
BACTERIOLOGICAL									
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)					
JAN	54	.	.	.	.	.	.	.	.
MAR	8	.	.	.	.	.	.	.	.
MAY	BDL	.	.	.	.	.	.	.	.
JUL	BDL	.	.	.	.	.	.	.	.
SEP	2	.	.	.	.	.	.	.	.
NOV	12	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF (COUNT/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML (A3)					
JAN	.	.	.	.	1 <=>	.	.	5 <=>	
MAR	.	7 <=>	.	.	.	.	.	1 <=>	
MAY	.	0 <=>	.	.	0 <=>	.	.	8 <=>	
JUL	.	2 <=>	.	.	14	.	.	11	
SEP	.	1 <=>	.	.	10	.	.	9 <=>	
NOV	.	1 <=>	.	.	2 <=>	.	.	13	
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)					
JAN	650	.	.	.	.	.	.	.	.
MAR	1600	.	.	.	.	.	.	.	.
MAY	30 <=>	.	.	.	.	.	.	.	.
JUL	BDL	.	.	.	.	.	.	.	.
SEP	30 <=>	.	.	.	.	.	.	.	.
NOV	1300	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = N/A					
JAN	6600	.	.	.	.	.	.	.	.
MAR	16200	.	.	.	.	.	.	.	.
MAY	2800	.	.	.	.	.	.	.	.
JUL	24000 >	.	.	.	.	.	.	.	.
SEP	2600	.	.	.	.	.	.	.	.
NOV	5100	.	.	.	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A		
JAN	.300	.100	.100	.300	.200	
MAR	.200	.100	.100	.200	.100	
MAY	.300	.100	.100	.300	.200	
JUL	.300	.100	.100	.200	.200	
SEP	.200	.100	.100	.200	.200	
NOV	.200	.100	.100	.400	.300	
FLD CHLORINE FREE (MG/L)						
		DET'N LIMIT = 0		GUIDELINE = N/A		
JAN	.700	.100	.100	.300	.600	
MAR	.900	.100	.100	.500	.800	
MAY	.700	.100	.100	.300	.700	
JUL	.700	.100	.100	.300	.400	
SEP	.600	.100	.100	.300	.500	
NOV	.700	.100	.100	.300	.600	
FLD CHLORINE (TOTAL) (MG/L)						
		DET'N LIMIT = 0		GUIDELINE = N/A		
JAN	1.000	.200	.200	.600	.800	
MAR	1.100	.200	.200	.700	.900	
MAY	1.000	.200	.200	.600	.900	
JUL	1.000	.200	.200	.500	.600	
SEP	.800	.200	.200	.500	.700	
NOV	.900	.200	.200	.700	.900	
FLD PH (DMNSLESS)						
		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)		
JAN	7.800	7.500	7.600	7.600	7.500	7.500
MAR	7.600	7.500	7.650	7.600	7.500	7.300
MAY	7.800	7.640	7.650	7.600	7.600	7.500
JUL	8.000	7.400	7.650	7.700	7.600	7.700
SEP	7.600	7.400	7.650	7.650	7.400	7.400
NOV	7.600	7.400	7.600	7.600	7.500	7.500
FLD TEMPERATURE (DEG.C)						
		DET'N LIMIT = N/A		GUIDELINE = 15 (A3)		
JAN	2.500	3.000	20.700	6.400	15.500	5.000
MAR	3.000	3.500	20.100	10.900	15.000	6.000
MAY	7.500	7.500	17.700	10.800	16.500	9.500
JUL	15.500	15.500	24.200	16.300	20.500	15.000
SEP	6.500	7.500	19.500	17.300	19.500	14.000
NOV	5.500	6.000	17.600	10.500	18.000	10.500
FLD TURBIDITY (FTU)						
		DET'N LIMIT = N/A		GUIDELINE = 1 (A1)		
JAN	4.600	.650	.290	.340	.350	.220
MAR	5.800	.560	.400	.340	.320	.180
MAY	3.900	.270	.750	.700	.200	.330
JUL	1.200	.410	.440	.470	.310	.300
SEP	6.850	.380	.280	.230	.120	.080
NOV	3.800	.380			.190	.240

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM		
RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 30-500 (A3)		
JAN	101.600	97.300	96.100	95.900	97.400	97.400
MAR	102.900	97.200	95.800	96.100	95.600	96.000
MAY	101.400	95.900	95.800	95.800	97.000	97.400
JUL	101.100	96.300	96.700	95.800	96.800	96.900
SEP	100.000	95.300	95.900	96.200	95.800	96.100
NOV	103.000	96.600	97.100	97.000	97.700	96.900
CALCIUM (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 100 (F2)		
JAN	44.100	41.900	42.300	43.100	42.500	43.600
MAR	40.000	40.400	41.300	41.300	41.500	41.500
MAY	42.000	42.800	42.200	43.000	42.000	38.700
JUL	41.300	42.000	41.400	42.000	42.200	43.200
SEP	42.400	43.200	42.800	43.000	43.000	43.800
NOV	43.600	43.100	43.500	43.700	43.900	43.900
CHLORIDE (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 250 (A3)		
JAN	28.500	30.200	27.600	27.400	29.900	31.100
MAR	24.600	27.900	25.200	26.300	28.100	27.900
MAY	23.100	25.000	24.400	24.400	25.100	24.800
JUL	22.700	24.600	24.500	24.400	24.700	24.400
SEP	22.800	24.200	23.900	23.500	24.400	24.300
NOV	22.900	25.100	24.800	25.100	26.900	26.400
COLOUR (HZU)		DET'N LIMIT = 0.5		GUIDELINE = 5 (A3)		
JAN	2.000 <T	1.000 <T	3.000	3.500	1.000 <T	.500
MAR	.500 <T	.500 <T	2.500	3.500	1.000 <T	.500 <T
MAY	1.000 <T	1.000 <T	2.000 <T	2.500	1.000 <T	1.000 <T
JUL	1.500 <T	.500 <T	2.000 <T	2.500	1.000 <T	.500 <T
SEP	1.500 <T	.500 <T	1.500 <T	2.000 <T	1.000 <T	.500 <T
NOV	BDL	3.500	3.000	2.500	1.500 <T	1.500 <T
CONDUCTIVITY (UMHO/CM)		DET'N LIMIT = 1.		GUIDELINE = 400 (F2)		
JAN	349	351	343	342	353	355
MAR	335	343	333	335	344	340
MAY	327	330	331	330	336	333
JUL	321	324	325	324	325	325
SEP	324	328	328	327	330	330
NOV	333	335	340	340	343	340
DISS ORG CARBON (MG/L)		DET'N LIMIT = .100		GUIDELINE = 5.0 (A3)		
JAN	1.900	1.900	1.700	1.600	1.900	1.800
MAR	1.800	1.700	1.600	1.500	1.700	1.700
MAY	1.900	1.900	1.900	1.800	1.900	2.000
JUL	1.900	2.000	2.000	1.800	2.100	2.000
SEP	1.800	1.700	1.600	1.600	1.700	1.700
NOV	1.900	1.800	1.800	1.700	1.900	1.800

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

	RAW		TREATED		SITE 1		SITE 2	
					STANDING	FREE FLOW	STANDING	FREE FLOW
FLUORIDE (MG/L)			DET'N LIMIT = 0.01		GUIDELINE = 2.4 (A1)			
JAN	.120		.940		1.060	1.020	1.000	.960
MAR	.120		1.040		1.040	1.000	1.080	1.080
MAY	.120		1.140		1.060	1.080	1.140	1.140
JUL	.120		1.020		.920	.880	1.040	1.040
SEP	.140		1.380		.720	.840	1.400	1.380
NOV	.140		1.320		1.280	1.220	1.420	1.400
HARDNESS (MG/L)			DET'N LIMIT = 0.5		GUIDELINE = 80-100 (A4)			
JAN	144.600		140.000		139.700	142.700	140.800	143.600
MAR	135.000		136.000		137.600	137.800	138.600	139.300
MAY	141.000		143.000		141.000	143.000	139.000	129.200
JUL	137.700		138.900		137.900	139.300	140.100	142.600
SEP	143.000		144.000		142.000	143.000	142.000	144.000
NOV	145.200		144.000		144.800	145.900	146.500	146.900
IONCAL (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = N/A			
JAN	3.703		1.779		2.485	4.204	2.133	3.357
MAR	2.045		.916		6.337	6.421	6.365	6.068
MAY	1.800		4.888		3.253	5.570	1.693	5.909
JUL	2.045		4.094		3.063	4.033	3.891	5.780
SEP	3.506		6.049		3.699	5.131	4.447	6.219
NOV	4.811		5.644		5.324	5.807	5.189	5.819
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = N/A			
JAN	.495		.424		.384	.341	.410	.441
MAR	.530		.329		.413	.364	.293	.325
MAY	.665		.349		.372	.361	.405	.362
JUL	.517		.413		.389	.401	.438	.448
SEP	.484		.351		.399	.393	.381	.380
NOV	.458		.285		.280	.212	.257	.214
MAGNESIUM (MG/L)			DET'N LIMIT = 0.10		GUIDELINE = 30 (F2)			
JAN	8.400		8.600		8.300	8.500	8.450	8.400
MAR	8.500		8.500		8.350	8.400	8.500	8.650
MAY	8.800		8.700		8.500	8.800	8.400	7.920
JUL	8.400		8.250		8.350	8.400	8.450	8.450
SEP	8.900		8.700		8.500	8.500	8.300	8.500
NOV	8.800		8.850		8.800	8.900	8.950	9.050
SODIUM (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 200 (A4)			
JAN	15.500		15.400		14.000	13.900	15.100	15.600
MAR	12.800		12.800		14.600	14.800	15.500	14.800
MAY	11.800		12.000		12.000	12.200	12.000	10.800
JUL	12.400		12.700		12.500	12.500	12.400	12.400
SEP	11.400		11.400		11.400	11.400	11.400	11.600
NOV	13.100		12.800		12.800	12.900	13.200	13.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
		STANDING		FREE FLOW		STANDING	
AMMONIUM TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = 0.05 (F2)			
JAN	.024	BDL	.056	BDL	.122	BDL	
MAR	.010	BDL	BDL	BDL	.322	BDL	
MAY	BDL	BDL	.004 <T	BDL	.304	BDL	
JUL	.024	.004 <T	.034	.002 <T	BDL	.004 <T	
SEP	BDL	.002 <T	.022	BDL	BDL	BDL	
NOV	.034	.010	.048	.012	.018	.012	
NITRITE (MG/L)		DET'N LIMIT = 0.001		GUIDELINE = 1 (A1)			
JAN	.033	.001 <T	.003 <T	.002 <T	.002 <T	.001 <T	
MAR	.010	.003 <T	.002 <T	.003 <T	.003 <T	.002 <T	
MAY	.006	.001 <T	.004 <T	.004 <T	.006	.002 <T	
JUL	.005	.003 <T	.005	.005	.003 <T	.004 <T	
SEP	.001 <T	BDL	BDL	BDL	BDL	BDL	
NOV	.013	.004 <T	.009	.009	.008	.009	
TOTAL NITRATES (MG/L)		DET'N LIMIT = 0.005		GUIDELINE = 10 (A1)			
JAN	.465	.440	.500	.410	.615	.445	
MAR	.425	.430	.380	.365	.770	.385	
MAY	.325	.330	.340	.325	.725	.330	
JUL	.240	.240	.270	.250	.265	.245	
SEP	.380	.390	.445	.380	.400	.395	
NOV	.415	.410	.465	.435	.470	.440	
NITROGEN TOT KJELD (MG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A			
JAN	.290	.210	.280	.180	.320	.180	
MAR	.320	.220	.200	.200	.550	.190	
MAY	.290	.180	.220	.170	.530	.180	
JUL	.250	.220	.240	.200	.220	.200	
SEP	.230	.200	.220	.190	.180	.200	
NOV	.300	.230	.260	.180	.210	.220	
PH (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)			
JAN	8.290	8.260	8.220	8.170	8.240	8.260	
MAR	8.360	8.180	8.260	8.210	8.140	8.170	
MAY	8.480	8.180	8.210	8.190	8.240	8.230	
JUL	8.340	8.250	8.230	8.240	8.270	8.270	
SEP	8.300	8.180	8.230	8.220	8.210	8.200	
NOV	8.250	8.110	8.100	8.030	8.070	8.030	
PHOSPHORUS FIL REACT (MG/L)		DET'N LIMIT = 0.0005		GUIDELINE = N/A			
JAN	.001 <T	.005	.	.	.	.	
MAR	.000 <T	.001 <T	.	.	.	.	
MAY	.001 <T	.001 <T	.	.	.	.	
JUL	BDL	.003	.	.	.	.	
SEP	BDL	.000 <T	.	.	.	.	
NOV	BDL	.000 <T	.	.	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHOSPHORUS TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = .40 (F2)		
JAN	.021	.012	.	.	.	.
MAR	.024	.007 <T	.	.	.	.
MAY	.017	.004 <T	.	.	.	.
JUL	.019	.009 <T	.	.	.	.
SEP	.011	.003 <T	.	.	.	.
NOV	.015	.005 <T	.	.	.	.
SULPHATE (MG/L)		DET'N LIMIT = .200		GUIDELINE = 500 (A3)		
JAN	27.430	27.780	28.240	28.600	27.550	27.530
MAR	25.780	25.970	25.330	24.070	24.050	23.830
MAY	27.390	27.370	28.540	28.520	27.640	26.990
JUL	26.290	26.870	26.740	27.840	27.070	26.970
SEP	26.910	26.860	28.330	27.090	26.430	26.690
NOV	27.720	28.050	29.110	29.100	28.050	28.610
TURBIDITY (FTU)		DET'N LIMIT = 0.05		GUIDELINE = 1 (A1)		
JAN	4.000	.620	.390	.360	.300	.250
MAR	5.900	.630	.280	.400	.290	.400
MAY	2.100	.300	.300	.300	.300	.320
JUL	.730	.330	.370	.390	.260	.330
SEP	3.100	.160 <T	.400	.280	.160 <T	.170 <T
NOV	2.900	.220	.730	.350	.280	.370

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

SITE 2

STANDING

FREE FLOW

STANDING

FREE FLOW

METALS

SILVER (UG/L)

DET'N LIMIT = 0.05

GUIDELINE = 50 (A1)

JAN	BDL	BDL	BDL	BDL	BDL	BDL
MAR	BDL	BDL	.100 <T	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL

ALUMINUM (UG/L)

DET'N LIMIT = 0.10

GUIDELINE = 100 (A4)

JAN	37.000	200.000	66.000	59.000	67.000	61.000
MAR	56.000	280.000	83.000	67.000	78.000	76.000
MAY	27.000	120.000	140.000	140.000	110.000	130.000
JUL	5.500	150.000	220.000	170.000	150.000	140.000
SEP	23.000	75.000	66.000	65.000	70.000	70.000
NOV	24.000	89.000	61.000	58.000	68.000	83.000

ARSENIC (UG/L)

DET'N LIMIT = 0.10

GUIDELINE = 25 (A1)

JAN	.870 <T	1.300	.780 <T	.740 <T	1.100	1.200
MAR	.940 <T	.560 <T	.870 <T	.470 <T	.290 <T	.300 <T
MAY	1.000 <T	.570 <T	.770 <T	.860 <T	.630 <T	.750 <T
JUL	.540 <T	1.100	1.000 <T	1.200	1.100	.810 <T
SEP	1.000 <T	.970 <T	.540 <T	.700 <T	1.000 <T	1.100
NOV	.780 <T	.770 <T	.570 <T	.610 <T	.500 <T	.430 <T

BARIUM (UG/L)

DET'N LIMIT = 0.05

GUIDELINE = 1000 (A2)

JAN	24.000	24.000	26.000	24.000	24.000	24.000
MAR	24.000	23.000	26.000	23.000	23.000	23.000
MAY	24.000	24.000	25.000	24.000	24.000	24.000
JUL	18.000	25.000	24.000	21.000	24.000	24.000
SEP	24.000	24.000	24.000	23.000	24.000	24.000
NOV	21.000	21.000	22.000	21.000	22.000	23.000

BORON (UG/L)

DET'N LIMIT = 2.00

GUIDELINE = 5000 (A1)

JAN	26.000	30.000	26.000	27.000	31.000	31.000
MAR	32.000	26.000	33.000	33.000	34.000	28.000
MAY	83.000	47.000	35.000	94.000	53.000	37.000
JUL	21.000	27.000	27.000	24.000	25.000	25.000
SEP	42.000	41.000	31.000	27.000	54.000	39.000
NOV	23.000	28.000	26.000	29.000	25.000	26.000

BERYLLIUM (UG/L)

DET'N LIMIT = 0.05

GUIDELINE = 6800 (D4)

JAN	BDL	BDL	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL
MAY	.130 <T	BDL	BDL	.060 <T	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	.060 <T	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
CADMIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 5		(A1)	
JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	.090 <T	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	.060 <T	BDL	BDL	BDL	BDL
NOV	.080 <T	BDL	.060 <T	.060 <T	BDL	BDL	BDL
COBALT (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A			
JAN	.110 <T	.090 <T	.070 <T	.110 <T	.100 <T	.150 <T	
MAR	.090 <T	BDL	.050 <T	.030 <T	.040 <T	BDL	
MAY	.150 <T	.120 <T	.090 <T	.130 <T	.140 <T	.050 <T	
JUL	.050 <T	.120 <T	.060 <T	.040 <T	.060 <T	.050 <T	
SEP	.090 <T	.060 <T	.090 <T	.050 <T	.090 <T	.070 <T	
NOV	.090 <T	.080 <T	.050 <T	.080 <T	.090 <T	.030 <T	
CHROMIUM (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 50 (A1)			
JAN	BDL	.960 <T	BDL	BDL	.810 <T	1.200 <T	
MAR	3.400 <T	.950 <T	2.900 <T	2.700 <T	BDL	1.100 <T	
MAY	2.400 <T	1.100 <T	.670 <T	2.800 <T	1.000 <T	.790 <T	
JUL	.580 <T	.890 <T	1.200 <T	.810 <T	BDL	BDL	
SEP	3.900 <T	3.900 <T	1.200 <T	.860 <T	3.200 <T	3.400 <T	
NOV	.830 <T	1.700 <T	.680 <T	1.800 <T	.510 <T	BDL	
COPPER (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)			
JAN	2.300 <T	3.200 <T	37.000	6.400	42.000	6.700	
MAR	1.700 <T	3.700 <T	40.000	5.100	37.000	5.300	
MAY	1.000 <T	1.000 <T	20.000	3.100 <T	32.000	4.900 <T	
JUL	1.100 <T	2.400 <T	22.000	3.200 <T	20.000	3.900 <T	
SEP	1.300 <T	1.200 <T	26.000	5.000 <T	37.000	6.600	
NOV	1.500 <T	1.500 <T	28.000	4.000 <T	30.000	8.300	
IRON (UG/L)		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)			
JAN	66.000	14.000 <T	120.000	150.000	BDL	BDL	
MAR	76.000	31.000 <T	100.000	130.000	BDL	BDL	
MAY	25.000 <T	BDL	72.000	96.000	BDL	BDL	
JUL	BDL	9.600 <T	100.000	110.000	BDL	BDL	
SEP	37.000 <T	BDL	63.000	81.000	8.300 <T	8.100 <T	
NOV	44.000 <T	BDL	110.000	110.000	BDL	7.800 <T	
MERCURY (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 1		(A1)	
JAN	BDL	BDL	.	.	.	.	
MAR	.030 <T	BDL	.	.	.	.	
MAY	BDL	BDL	.	.	.	.	
JUL	BDL	BDL	.	.	.	.	
SEP	BDL	BDL	.	.	.	.	
NOV	BDL	BDL	.	.	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
MANGANESE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50 (A3)			
JAN	5.900	2.000	9.500	10.000	.550	.690	
MAR	5.800	2.500	9.600	9.200	.620	.660	
MAY	2.900	.420 <T	7.900	8.500	.450 <T	.630	
JUL	2.000	1.000	10.000	11.000	.790	.940	
SEP	3.800	.520	10.000	11.000	.500 <T	.540	
NOV	3.500	.530	9.200	9.000	.510	.690	
MOLYBDENUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = N/A			
JAN	1.200	1.200	1.200	1.100	1.300	1.300	
MAR	1.200	1.300	1.300	1.200	1.300	1.300	
MAY	1.100	1.100	1.100	1.100	1.100	1.200	
JUL	.900	1.300	1.200	.990	1.200	1.100	
SEP	1.200	1.200	1.100	1.200	1.200	1.100	
NOV	1.100	1.100	1.000	1.200	1.300	1.300	
NICKEL (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 350 (D3)			
JAN	.670 <T	BDL	14.000	.660 <T	24.000	.840 <T	
MAR	1.000 <T	BDL	7.300	.760 <T	4.000	.490 <T	
MAY	1.200 <T	1.200 <T	2.600	.920 <T	16.000	.930 <T	
JUL	.420 <T	1.200 <T	2.800	.860 <T	10.000	1.000 <T	
SEP	1.200 <T	1.200 <T	26.000	1.100 <T	15.000	1.100 <T	
NOV	1.400 <T	1.300 <T	5.100	1.500 <T	9.400	.560 <T	
LEAD (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 10. (A1)			
JAN	.460 <T	.150 <T	2.000	.210 <T	1.600	.270 <T	
MAR	.240 <T	.100 <T	2.000	.170 <T	1.900	.260 <T	
MAY	.110 <T	BDL	1.800	.190 <T	2.800	.370 <T	
JUL	.070 <T	.120 <T	2.300	.230 <T	3.600	.360 <T	
SEP	.190 <T	BDL	1.800	.230 <T	3.600	.700	
NOV	.230 <T	BDL	1.800	.200 <T	2.500	.620	
ANTIMONY (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 146 (D4)			
JAN	.520	.480 <T	.610	.480 <T	.600	.620	
MAR	.500 <T	.380 <T	.700	.630	.550	.520	
MAY	.430 <T	.400 <T	.430 <T	.430 <T	.410 <T	.440 <T	
JUL	.340 <T	.510	.590	.370 <T	.630	.570	
SEP	.620	.640	.560	.550	.710	.570	
NOV	.390 <T	.510	.510	.550	.570	.630	
SELENIUM (UG/L)		DET'N LIMIT = 1.00		GUIDELINE = 10 (A1)			
JAN	BDL	BDL	BDL	BDL	BDL	1.200 <T	
MAR	BDL	BDL	BDL	BDL	BDL	BDL	
MAY	BDL	BDL	1.400 <T	BDL	1.600 <T	BDL	
JUL	BDL	1.300 <T	1.100 <T	BDL	1.300 <T	BDL	
SEP	BDL	1.400 <T	1.600 <T	1.400 <T	1.800 <T	1.700 <T	
NOV	BDL	BDL	BDL	BDL	BDL	BDL	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

		RAW	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
STRONTIUM (UG/L)				DET'N LIMIT = 0.10	GUIDELINE = N/A		
JAN	180.000		180.000	190.000	180.000	190.000	190.000
MAR	220.000		220.000	230.000	170.000	170.000	180.000
MAY	180.000		180.000	170.000	170.000	170.000	170.000
JUL	150.000		190.000	190.000	160.000	190.000	190.000
SEP	190.000		190.000	180.000	190.000	190.000	190.000
NOV	160.000		160.000	170.000	170.000	180.000	180.000
TITANIUM (UG/L)				DET'N LIMIT = 0.50	GUIDELINE = N/A		
JAN	4.700 <T		4.000 <T	3.600 <T	3.600 <T	2.600 <T	2.200 <T
MAR	7.100		5.300	4.100 <T	3.600 <T	3.500 <T	3.900 <T
MAY	7.600		6.600	6.600	6.600	7.000	6.800
JUL	7.200		8.400	8.700	7.600	3.100 <T	2.700 <T
SEP	5.200		4.000 <T	3.700 <T	3.900 <T	4.400 <T	3.900 <T
NOV	2.500 <T		2.400 <T	2.300 <T	2.300 <T	2.100 <T	1.900 <T
URANIUM (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)		
JAN	.340 <T		.300 <T	.360 <T	.320 <T	.330 <T	.320 <T
MAR	.290 <T		.200 <T	.330 <T	.300 <T	.220 <T	.190 <T
MAY	.350 <T		.350 <T	.430 <T	.420 <T	.350 <T	.340 <T
JUL	.170 <T		.400 <T	.380 <T	.360 <T	.350 <T	.350 <T
SEP	.350 <T		.330 <T	.310 <T	.280 <T	.320 <T	.350 <T
NOV	.300 <T		.290 <T	.290 <T	.280 <T	.290 <T	.320 <T
VANADIUM (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = N/A		
JAN	.350 <T		.310 <T	.340 <T	.280 <T	.300 <T	.360 <T
MAR	.340 <T		.300 <T	.420 <T	.310 <T	.260 <T	.260 <T
MAY	.280 <T		.220 <T	.240 <T	.270 <T	.230 <T	.230 <T
JUL	.130 <T		.200 <T	.330 <T	.240 <T	.280 <T	.260 <T
SEP	.320 <T		.240 <T	.300 <T	.270 <T	.250 <T	.260 <T
NOV	.170 <T		.130 <T	.200 <T	.220 <T	.130 <T	.150 <T
ZINC (UG/L)				DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)		
JAN	2.400		1.900 <T	28.000	3.200	23.000	3.200
MAR	2.500		1.600 <T	31.000	2.400	21.000	2.200
MAY	1.300 <T		.920 <T	13.000	1.500 <T	28.000	1.900 <T
JUL	2.200		.820 <T	11.000	1.300 <T	18.000	1.800 <T
SEP	2.500		1.700 <T	20.000	3.000	28.000	2.900
NOV	4.200		3.300	25.000	3.500	26.000	6.200

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS						
HEXACHLOROBUTADIENE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 450 (D4)		
JAN	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	1.000 <T	.	BDL	.	BDL
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 1900 (D4)		
JAN	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	4.000 <T	.	4.000 <T	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW

PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 700 (G)	
JAN	3.000 <T	2.000 <T	.	2.000 <T	.	2.000 <T
MAR	BDL	2.000 <T	.	2.000 <T	.	2.000 <T
MAY	1.000 <T	3.000 <T	.	2.000 <T	.	1.000 <T
JUL	1.000 <T	3.000 <T	.	1.000 <T	.	2.000 <T
SEP	1.000 <T	1.000 <T	.	1.000 <T	.	1.000 <T
NOV	2.000 <T	1.000 <T	.	2.000 <T	.	2.000 <T

LINDANE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 4000 (A1)	
JAN	BDL	1.000 <T	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL

ATRAZINE (NG/L)			DET'N LIMIT = 50		GUIDELINE = 60000 (A2)	
JAN	BDL	BDL	.	.	.	.
MAR	110.000 <T	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUL	90.000 <T	80.000 <T	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS						
PHENOLICS (UG/L	)		DET'N LIMIT = .200	GUIDELINE = 2	(A4)	
JAN	1.000	3.800	.	.	.	.
MAR	.800 <T	.800 <T	.	.	.	.
MAY	.400 <T	.400 <T	.	.	.	.
JUL	!NR	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
NOV	1.600	2.200	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)	)		DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JAN	BDL	BDL	.	BDL	.	BDL
MAR	.100 <T	.050 <T	.	BDL	.	.100 <T
MAY	BDL	BDL	.	.050 <T	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
TOLUENE (UG/L)	)		DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)		
JAN	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	.050 <T	.	BDL	.	BDL
SEP	BDL	BDL	.	.050 <T	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
ETHYLBENZENE (UG/L)	)		DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
JAN	BDL	BDL	.	BDL	.	.050 <T
MAR	.150 <T	.150 <T	.	.050 <T	.	.100 <T
MAY	.050 <T	BDL	.	.050 <T	.	BDL
JUL	BDL	.100 <T	.	BDL	.	.100 <T
SEP	.050 <T	BDL	.	BDL	.	.100 <T
NOV	BDL	.150 <T	.	BDL	.	.050 <T
O-XYLENE (UG/L)	)		DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)		
JAN	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	.050 <T
MAY	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
STYRENE (UG/L)	)		DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
JAN	BDL	BDL	.	.150 <T	.	.050 <T
MAR	.200 <T	BDL	.	.100 <T	.	BDL
MAY	.100 <T	BDL	.	.150 <T	.	BDL
JUL	.050 <T	.100 <T	.	BDL	.	.100 <T
SEP	.050 <T	BDL	.	BDL	.	BDL
NOV	.050 <T	BDL	.	.100 <T	.	BDL
CHLOROFORM (UG/L)	)		DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	BDL	19.500	.	8.800	.	18.300
MAR	BDL	22.800	.	11.700	.	19.500
MAY	BDL	16.400	.	8.900	.	16.300
JUL	BDL	20.900	.	14.900	.	21.800
SEP	BDL	12.100	.	9.100	.	12.800
NOV	BDL	17.600	.	10.600	.	17.700

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM OSHAWA WSS 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
111, TRICHLOROETHANE (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 200 (D1)			
JAN	BDL	BDL	.	BDL	.	.	.040 <T
MAR	BDL	BDL	.	BDL	.	.	BDL
MAY	BDL	BDL	.	BDL	.	.	BDL
JUL	BDL	BDL	.	BDL	.	.	BDL
SEP	BDL	BDL	.	BDL	.	.	BDL
NOV	BDL	.060 <T	.	BDL	.	.	BDL
CARBON TETRACHLORIDE (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 5 (A1)			
JAN	BDL	BDL	.	BDL	.	.	BDL
MAR	BDL	BDL	.	BDL	.	.	BDL
MAY	BDL	BDL	.	BDL	.	.	BDL
JUL	BDL	BDL	.	BDL	.	.	BDL
SEP	BDL	BDL	.	BDL	.	.	BDL
NOV	BDL	.200 <T	.	BDL	.	.	.200 <T
DICHLOBROMOMETHANE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)			
JAN	BDL	13.550	.	8.500	.	.	12.350
MAR	BDL	13.700	.	9.100	.	.	11.900
MAY	BDL	10.600	.	7.350	.	.	10.300
JUL	BDL	12.000	.	9.750	.	.	12.000
SEP	BDL	10.250	.	8.250	.	.	10.400
NOV	BDL	12.400	.	8.950	.	.	12.300
CHLORODIBROMOMETHANE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)			
JAN	BDL	5.000	.	3.800	.	.	5.000
MAR	BDL	5.200	.	4.300	.	.	4.900
MAY	BDL	4.700	.	3.900	.	.	4.800
JUL	BDL	5.600	.	5.000	.	.	5.600
SEP	BDL	5.600	.	5.100	.	.	5.600
NOV	BDL	5.400	.	4.400	.	.	6.100
BROMOFORM (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 350 (A1+)			
JAN	BDL	.600 <T	.	.600 <T	.	.	.600 <T
MAR	BDL	.400 <T	.	.600 <T	.	.	.400 <T
MAY	BDL	.600 <T	.	.400 <T	.	.	.600 <T
JUL	BDL	.600 <T	.	.400 <T	.	.	.400 <T
SEP	BDL	.600 <T	.	.800 <T	.	.	.600 <T
NOV	BDL	.600 <T	.	.600 <T	.	.	.600 <T
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)			
JAN	BDL	38.550	.	21.550	.	.	36.150
MAR	BDL	42.100	.	25.700	.	.	36.700
MAY	BDL	31.700	.	20.550	.	.	32.000
JUL	BDL	39.100	.	30.050	.	.	39.850
SEP	BDL	28.600	.	23.150	.	.	29.550
NOV	BDL	36.050	.	24.500	.	.	36.750

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER -----	UNIT ----	DETECTION LIMIT -----	GUIDELINE -----
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADIX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPACINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLOROPHOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P)

VOLATILES

CLASS: HEALTH		METHOD: POCODO		UNIT: µg/L		
SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C₆H₆

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27).
CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41).
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39).

ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:

MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap with sample water three times
- fill to 2 cm from top

Bacteriological

- 220 mL plastic bottle with white seal on cap
- do not rinse bottle, preservative has been added
- avoid touching bottle neck or inside of cap
- fill to top of red label as marked

Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid (HNO_3)
(Caution: HNO_3 is corrosive)

Volatiles (duplicates) (OPOPUP)

- 45 mL glass vial with septum (teflon side must be in contact with sample)
- do not rinse bottle
- fill bottle completely without bubbles

Organics (OWOC), (OWTRI), (OAPAHX)

- 1 L amber glass bottle per scan
- do not rinse bottle
- fill to 2 cm from top
- when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
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Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
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Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
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Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
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Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid HNO_3
(Caution: HNO_3 is corrosive)

Volatiles (duplicate)
(OPOPUP)

- 45 mL glass vial with septum
(teflon side must be in contact
with sample)
- do not rinse bottle, preservative
has been added
- fill bottle completely without
bubbles

Organics
(OWOC) (OAPAHX)

- 1 L amber glass bottle per scan
- do not rinse bottle
- fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total),
turbidity and pH on submission sheet.

